

Title: Pick Me!

Brief Overview:

This probability unit will allow students to collect, organize, analyze, and interpret data in a meaningful context while offering classroom teachers a class management technique. Students will investigate the probability that their chosen numbers will be picked, thus allowing them to participate in classroom activities. The unit will culminate in an activity requiring each student to select a number between one and thirty and justify his/her choice.

Links to NCTM 2000 Standards:

- **Standard 1: Number and Operation**

Mathematics instructional programs should foster the development of number and operation sense so that all students understand numbers, ways of representing numbers, relationships among numbers, and number systems.

- **Standard 2: Patterns, Functions, and Algebra**

Mathematics instructional programs should include attention to patterns, functions, symbols, and models so that all students understand various types of patterns and functional relationships.

- **Standard 5: Data Analysis, Statistics, and Probability**

Mathematics instructional programs should include attention to data analysis, statistics, and probability so that all students pose questions and collect, organize, and represent data to answer those questions; interpret data using methods of exploratory data analysis; develop and evaluate inferences, predictions, and arguments that are based on data; and understand and apply basic notions of chance and probability.

- **Standard 6: Problem Solving**

Mathematics instructional programs should focus on solving problems as part of understanding mathematics so that all students build new mathematical knowledge through their work with problems; and monitor and reflect on their mathematical thinking in solving problems.

- **Standard 7: Reasoning and Proof**

Mathematics instructional programs should focus on learning to reason and construct proofs as part of understanding mathematics so that all students recognize reasoning and proof as essential and powerful parts of mathematics; make and investigate mathematical conjectures; and develop and evaluate mathematical arguments and proofs.

- **Standard 8: Communication**

Mathematics instructional programs should use communication to foster an understanding of mathematics so that all students organize and consolidate their mathematical thinking to communicate with others; express mathematical ideas coherently and clearly to peers, teachers, and others; extend their mathematical knowledge by considering the thinking and strategies of others; and use the language of mathematics as a precise means of mathematical expression.

- **Standard 9: Connections**

Mathematics instructional programs should emphasize connections to foster an understanding of mathematics so that all students recognize and use connections among different mathematical ideas.

- **Standard 10: Representation**

Mathematics instructional programs should emphasize mathematical representations to foster an understanding of mathematics so that all students create and use representations to organize, record, and communicate mathematical ideas.

Grade/Level:

Grade 5

Duration/Length:

7 half days

Prerequisite Knowledge:

Students should have working knowledge of:

- Working in cooperative groups
- Writing a persuasive paragraph
- Collecting, organizing, and displaying data
- Constructing line plots
- Math vocabulary: prime number, composite number, multiples
- Fractions

Student Outcomes:

Students will:

- complete a frequency table.
- use fractions to state the probability of selecting prime, composite, or multiples of numbers from one to thirty.
- interpret a line plot and draw conclusions from it.
- communicate mathematical data through writing.

Materials/Resources/Printed Materials:

- Thirty bottle caps
- Permanent marker
- Thirty pencils
- Post-It notes, 30 of five different colors
- Composition paper
- Large, clear plastic jar
- Vocabulary Review: Student Resource #1
- Frequency Table Sheet: Student Resource #2
- Writing Prompt: Student Resource #3
- Overhead Line Plot Grid: Teacher Resource #1
- Answer Key for Frequency Table: Teacher Resource #2
- Scoring Rubric for Writing Paragraph: Teacher Resource #3

Development/Procedures:

Day 1: a.m.

- 1) Review vocabulary using Student Resource #1. Distribute Student Resource #2 to each student. Have each student complete frequency chart from numbers 1 through 10 as a whole class activity.
- 2) Break into groups of three to complete frequency chart for numbers 11 through 30.
- 3) Have each student individually analyze the data from the frequency chart to choose the number he/she feels stands the greatest chance of being picked. Using Student Resource #3 each student will support their number choice using the collected data from Student Resource #2.

Day 1: p.m.

- 1) Teacher will number thirty bottle caps each with one number from 1 through 30 and place in a clear, plastic jar.
- 2) Teacher will distribute the first set of Post-It notes to students. Students will label their Post-It notes with name and chosen number from Student Resource Sheet #3.
- 3) After shaking the jar, the teacher will draw bottle caps until six **prime numbers** have been selected. Numbers that are not prime will not be announced.
- 4) Each student will record on his Post-It note if his number is drawn.
- 5) Collect first set of Post-It notes.

Day 2: a.m.

- 1) Teacher will distribute the second set of Post-It notes to students. Students will label their Post-It notes with name and chosen number from Student Resource Sheet #3.
- 2) After shaking the jar, the teacher will draw bottle caps until six **composite numbers** have been selected. Numbers that are not composite will not be announced.
- 3) Each student will record on his Post-It note if his number is drawn.
- 4) Collect second set of Post-It notes.

Day 2: p.m.

- 1) Teacher will distribute the third set of Post-It notes to students. Students will label their Post-It notes with name and chosen number from Student Resource Sheet #3.
- 2) After shaking the jar, the teacher will draw bottle caps until six **numbers that are multiples of 3** have been selected. Numbers that are not multiples of 3 will not be announced.
- 3) Each student will record on his Post-It note if his number is drawn.
- 4) Collect third set of Post-It notes.

Day 3: a.m.

- 1) Teacher will distribute the fourth set of Post-It notes to students. Students will label their Post-It notes with name and chosen number from Student Resource Sheet #3.
- 2) After shaking the jar, the teacher will draw bottle caps until six **numbers that are multiples of 4** have been selected. Numbers that are not multiples of 4 will not be announced.
- 3) Each student will record on his Post-It note if his number is drawn.
- 4) Collect fourth set of Post-It notes.

Day 3: p.m.

- 1) Teacher will distribute the fifth set of Post-It notes to students. Students will label their Post-It notes with name and chosen number from Student Resource Sheet #3.
- 2) After shaking the jar, the teacher will draw bottle caps until six **numbers that are multiples of 5** have been selected. Numbers that are not multiples of 5 will not be announced.
- 3) Each student will record on his Post-It note if his number is drawn.
- 4) Collect fifth set of Post-It notes.

Day 4: a.m.

- 1) Return all Post-It notes to students.
- 2) On the overhead display Teacher Resource #1, record the number of times each number was selected using the Post-It note data.
- 3) As a class activity, analyze the graph data to determine which numbers had a greater chance of being selected and why. Refer to Frequency Chart: Student Resource Sheet #2.

Performance Assessment:

Assessment will be based on participation and discussion, frequency charts, and writing prompts. Teacher will use Writing Rubric: Teacher Resource #3 to assess paragraph.

Extension/Follow Up:

- Using the numbers from 40 through 60, determine which numbers have the greatest chance of being selected using the same characteristic descriptors from Frequency Chart: Student Resource #2.
- Using a Venn diagram convert your findings from Frequency Chart #1. Compare readability of Frequency Chart to Venn diagram.
- In cooperative groups, have one member secretly choose a number from 10 through 40. Other members of the group will guess the number after asking questions regarding the number's characteristics.

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Vocabulary

Name _____

A **prime number** is a whole number greater than 1 that has only two factors, itself and 1.

EX: The prime number 3 has factors of 1 and 3.

A **composite number** is any whole number greater than 1 that has more than two different factors.

EX: The composite number 6 has factors of 1, 2, 3, and 6.

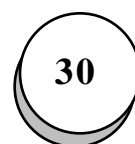
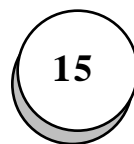
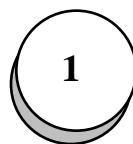
Multiples are the product of a given whole number and any other whole number.

EX: The multiples of 2 are 2, 4, 6, 8,...

The multiples of 10 are 10, 20, 30,...

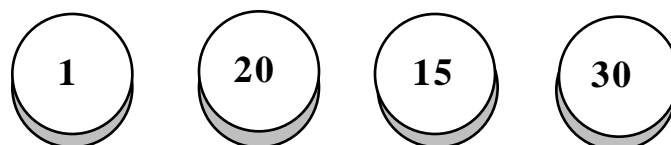
Analyzing Characteristics

| Descriptor | | | | | | | | | | | | | | | | Count | Relative Frequency | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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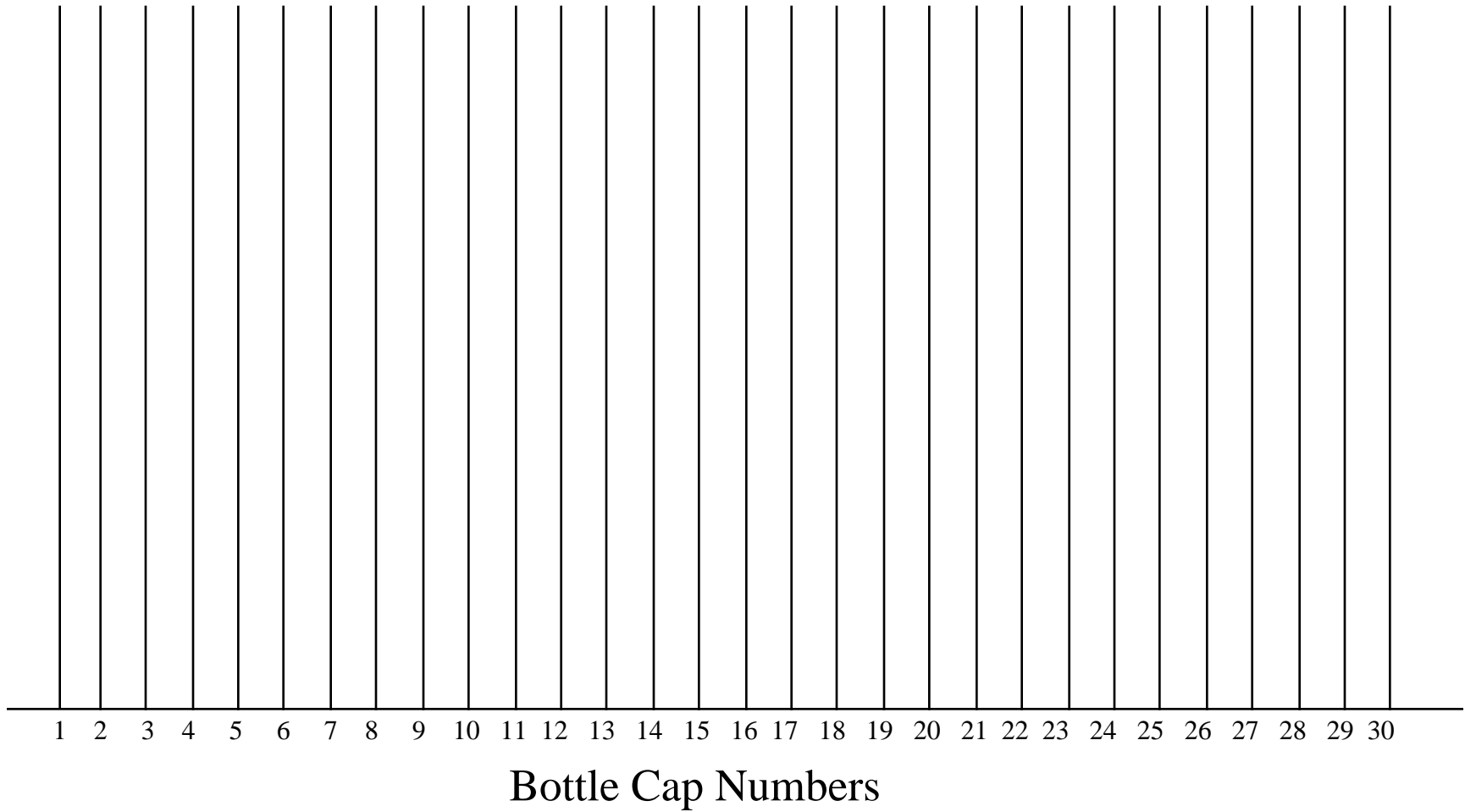


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Frequency Chart Line Plot



Writing Prompt

Name_____

Only fifth grade students are permitted to captain the intramural sports teams. Your teacher will allow those four students whose numbers are selected most frequently to choose not only which sport they captain, but also their first draft choice.

In order to review the concepts of prime numbers, composite numbers, and multiples of 3, 4, and 5, your teacher will stage five lotteries. During each lottery the teacher will choose one of the characteristics and then draw numbers until six numbers that have those characteristics have been drawn. For example, in the first lottery the teacher will draw bottle caps until 6 prime numbers have been chosen.

You wish to increase your chances of becoming captain by picking that one number from 1 through 30 with the greatest chance of being picked. After choosing your number, justify your choice using the data collected on Frequency Chart: Student Resource #2. Make sure you use complete sentences and that your explanation is supported by your data. Write your paragraph on composition paper.

Rubric for Writing

Score Point 4

All of the following are evident:

- Number is stated.
- Three reasons are given using the unit vocabulary to justify his/her choice.
- Complete sentences are used.

Score Point 3

All of the following are evident:

- Number is stated.
- Two reasons are given using the unit vocabulary to justify his/her choice.
- Complete sentences are usually evident.

Score Point 2

All of the following are evident:

- Number is stated.
- One reason is given using the unit vocabulary to justify his/her choice.
- Complete sentences are sometimes evident.

Score Point 1

All of the following are evident:

- Number is stated, but no reason is given using the unit vocabulary to justify his/her choice.
- No number is chosen, but a reason is given using the unit vocabulary to justify his/her choice.
- Complete sentences are rarely evident.

Score Point 0

- Answer is either off task or missing.